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## (54) IMPROVEMENTS IN OR RELATING TO COMPRESSOR BLEED VALVES

(71) We, ROLLS-ROYCE (1971) LIMITED, a British Company, of 1 Bank Buildings, Princes Street, London, W.C.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to compressor bleed valves which may be used, for example, for relieving excess pressure or flow in axial flow compressors.

According to the present invention, there is provided a bleed valve forming a part of an axial flow compressor the casing of which is provided with a plurality of apertures, the valve including an inflatable member secured to the casing of a compressor and encircled by a relatively rigid member, the inflatable member being movable from a position in which the member closes off the plurality of apertures in the casing of the compressor to a position in which the apertures are open, the inflatable member comprising two elastomeric cylinders joined together at their edges by two circular clamping members. One of the clamping members may be attached to the relatively rigid member and the other one of the clamping members may be attached to the casing of the compressor.

The edges of the elastomeric cylinders may be clamped between the clamping members and the rigid member and compressor casing respectively.

The edges of the elastomeric cylinders may be folded over to contain a circular length of reinforcing wire.

The inflatable member may either be inflatable by means of a tapping taken from the compressor downstream of the bleed valve or by means of a dynamic head tapping from the compressor taken adjacent the bleed valve.

The relatively rigid member may comprise a metal cylinder and the relatively rigid mem-

ber may be movable by means of an hydraulic jack or similar power source.

The present invention will now be more particularly described with reference to the accompanying drawing which shows a portion of an axial flow compressor having one form of bleed valve according to the present invention.

In the drawing, a bleed valve 10 is secured to the casing 12 of an axial flow compressor 14. The casing is provided with two circumferential rows of apertures 16 which are arranged to be closed off by means of the valve 10.

The valve 10 consists of two cylinders of elastomeric material each cylinder being turned into a U-shaped section and the edges of the two cylinders being jointed together to form a tube. The edges of the cylinders are turned over to include a reinforcing wire 18 and the edges are joined together by means of two circular clamping members 20 and 22. Each of the clamping members 20 and 22 have arms 20a, 20b and 22a, 22b which are shaped to correspond with the turned over edges of the cylinders 15.

The clamping member 20 is attached to a metal cylinder 24 by means of a number of equi-spaced bolts 26 and the clamping member 22 is attached to the compressor casing 12 by means of a number of equi-spaced bolts 28.

The tube may be inflated by either one of two arrangements. In one arrangement, one of the bolts 28 is replaced by a hollow bolt which has a dynamic head tapping extending into the compressor and since the dynamic head will always be greater than the static head the pressure in the tube will always be greater than the static pressure in the compressor. In the alternative arrangement, a pressure feed is tapped from a downstream stage of the compressor.

In use, the tube is inflated and seals off the apertures 16. If the pressure in the compressor rises above a certain pre-determined

value, a pressure sensitive switch (not shown) will cause an hydraulic jack (not shown) to move the cylinder 24 and thus the tube to move rearwardly and expose the apertures.

- 5 When the pressure has fallen to a pre-determined value, the pressure sensitive switch will again operate and the above sequence of operations will take place in reverse and the apertures will be closed off. Also, the  
10 control mechanism may be so arranged that the apertures are only partially closed off.

# WHAT WE CLAIM IS:—

- 15 1. A bleed valve forming a part of an axial flow compressor the casing of which is provided with a plurality of apertures the valve including an inflatable member secured to the casing of a compressor and  
20 encircled by a relatively rigid member, the inflatable member being movable from a position in which the inflatable member closes off the plurality of apertures in the casing of a compressor to a position in which  
25 the apertures are open, the inflatable member comprising two elastomeric cylinders joined together at their edges by two clamping members.

- 30 2. A valve as claimed in claim 1 in which one of said clamping members is attached to the relatively rigid member and

the other one of said clamping members is secured to the casing of the compressor.

3. A valve as claimed in claim 1 or claim 2 in which the edges of the cylinders  
35 are folded over and contain a closed loop of reinforcing wire.

4. A valve as claimed in any one of the preceding claims in which the inflatable  
40 member is inflatable by means of compressor air tapped from the compressor downstream of the bleed valve.

5. A valve as claimed in any one of the preceding claims 1 to 3 in which the  
45 inflatable member is inflatable by means of a dynamic head tapping taken from the compressor adjacent to the bleed valve.

6. A valve as claimed in any one of the preceding claims in which the relatively rigid  
50 member comprises a metal cylinder.

7. A valve as claimed in any one of the preceding claims in which the relatively rigid member is movable by means of an hydraulic jack.

8. A bleed valve forming a part of an  
55 axial flow compressor constructed and arranged for use and operation substantially as herein described with reference to the accompanying drawing.

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